DRINKING WATER SURVEILLANCE PROGRAM

WINDSOR WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

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WINDSOR
WATER SUPPLY SYSTEM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

WINDSOR WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Windsor water supply system is a conventional treatment plant which treats water from the Detroit River. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Powdered activated carbon addition was initiated in October of 1990 for taste and odour control. This plant has a rated capacity of 272.5 x 1000 m^3/day. The Windsor water supply system serves a population of approximately 214,100.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Windsor water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
BACTERIOLOGICAL	18	18	100	5	0	0	4	0	0	4	1	25
CHEMISTRY (FLD)	15	15	100	30	30	100	60	58	96	60	42	70
CHEMISTRY (LAB)	132	113	85	129	93	72	224	191	85	227	196	86
METALS	144	59	40	144	42	29	276	114	41	276	125	45
CHLOROAROMATICS	84	0	0	84	0	0	84	0	0	84	0	0
CHLOROPHENOLS	6	0	0	6	0	0	.	.	.	.	.	.
PAH	99	0	0	82	0	0	17	0	0	17	0	0
PESTICIDES & PCB	206	0	0	206	0	0	128	0	0	128	0	0
PHENOLICS	6	0	0	5	1	20	.	.	.	.	.	.
SPECIFIC PESTICIDES	31	0	0	31	0	0	6	0	0	6	0	0
VOLATILES	174	0	0	174	24	13	174	24	13	145	20	13
OTAL	915	205		896	190		973	387		947	384	

DRINKING WATER SURVEILLANCE PROGRAM

WINDSOR WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Windsor water treatment plant in the summer of 1985 as part of a survey of the St. Clair/Detroit River area. Previous DWSP annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Windsor water supply system is a conventional treatment plant which treats water from the Detroit River. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Powdered activated carbon addition was initiated in October of 1990 for taste and odour control. This plant has a rated capacity of 272.5 x 1000 m^3/day. The Windsor water supply system serves a population of approximately 214,100.

The sample day flows ranged from 159.1 x 1000 m^3/day to 203.4 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic

compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the

method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and

corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 9 of 15 treated and distributed water samples with a maximum of 22.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 18 of 18 treated and distributed water samples with a maximum reported value of 143.0 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1 Formazin Turbidity Unit (FTU).

The lab turbidity exceeded the Maximum Acceptable Concentration in 1 treated water sample with a reported value of 1.5 FTU. This value was not confirmed by the corresponding field turbidity result; a more reliable test.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 8 of 18 treated and distributed water samples with a maximum reported value of 200.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 17 treated and distributed water samples analyzed with a maximum level of 47.9 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Windsor water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

WINDSOR WTP

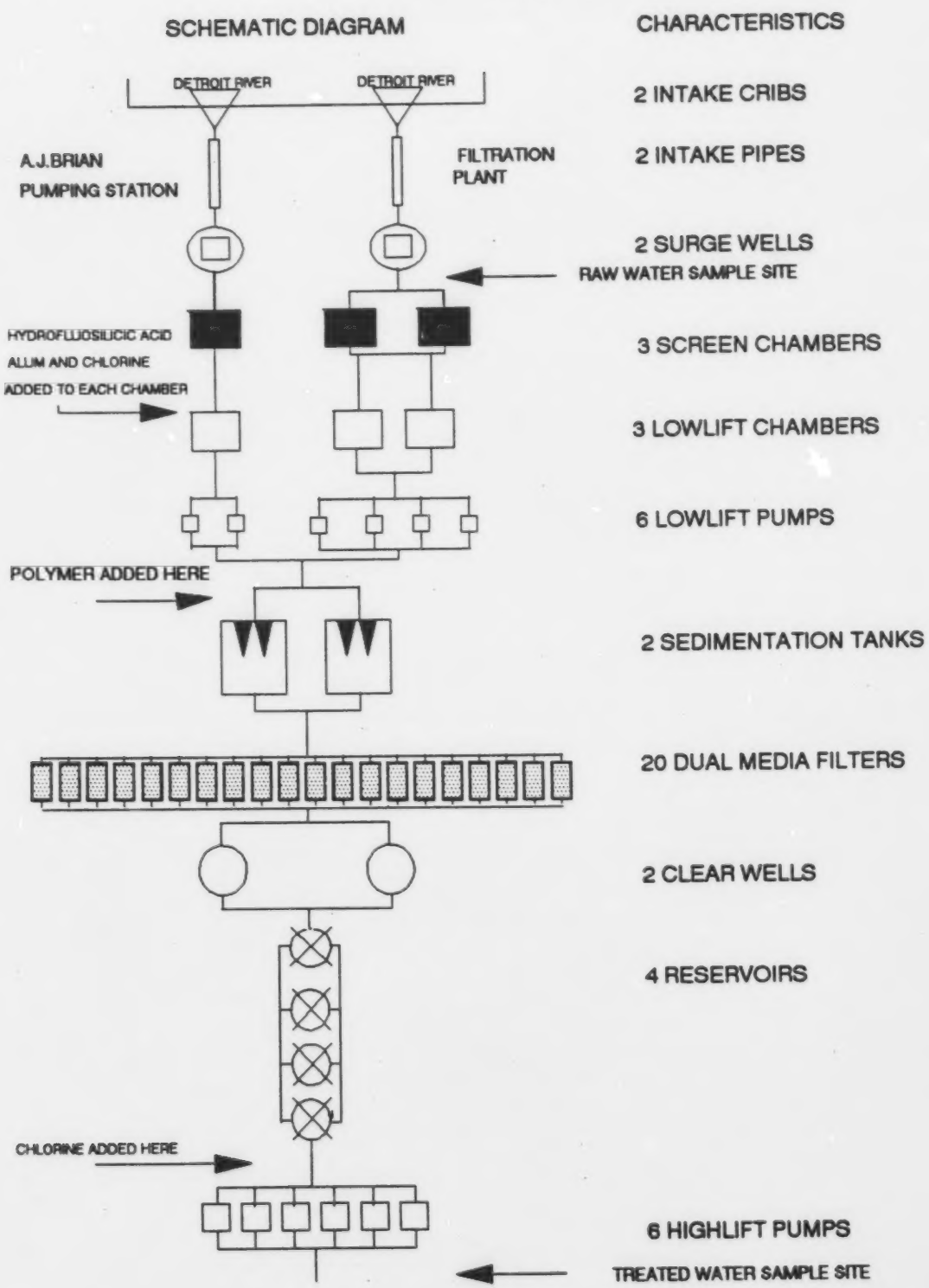

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003421
PLANT NAME: WINDSOR WTP

DISTRICT: WINDSOR
REGION: SOUTHWESTERN
DISTRICT OFFICER: J. DRUMMOND

UTM #:

PLANT SUPERINTENDENT: WAYNE A. MILLER

ADDRESS: 3665 WYANDOTTE STREET
WINDSOR, ONTARIO
N8Y 1G4
(519 255-2786)

MUNICIPALITY: WINDSOR
AUTHORITY: MUNICIPALITY

PLANT INFORMATION:

PLANT VOLUME	**0.000**	**(x 1000 m3)**
DESIGN CAPACITY	**182**	**(x 1000 m3)**
RATED CAPACITY	**0.000**	**(x 1000 m3)**

MUNICIPALITY:	**POPULATION:**
WINDSOR	195,028
SANDWICH SOUTH	3,748
SANDWICH WEST	13,744

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	HOURLY READING
	RAW WATER IN LAB	HOURLY READING
	TREATED WATER	CONTINUOUS
FLUORIDE	TREATED WATER IN LAB	HOURLY READING
	RAW WATER IN LAB	HOURLY READING
PH	TREATED WATER IN LAB	HOURLY READING
	RAW WATER IN LAB	HOURLY READING
TEMPERATURE	RAW WATER IN LAB	HOURLY READING
TURBIDITY	TREATED WATER IN LAB	HOURLY READING
	AFTER FILTERS	CONTINUOUS
	RAW WATER IN LAB	HOURLY READING
	RAW WATER	CONTINUOUS
	AFTER SETTLING TANKS	CONTINUOUS
	TREATED WATER	CONTINUOUS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)					
			PRE CHLORINATION	COAGULATION	FLUORIDATION	COAGULATION AID	POST CHLORINATION	TASTE & ODOUR
ATE	DELAY * TIME(HRS)	FLOW (1000M3)	CHLORINE	ALUM LIQUID	HYDROFLUOSILICIC ACID	POLYELECTROLYTE	CHLORINE	ACTIVATED CARBON POWDER
EB 14	21.90	159.110	.06	22.25	1.07	.05	1.70	
PR 11	17.80	171.884	2.06	18.65	1.08	.18	.07	
UN 14	16.20	203.434	1.88	35.00	1.02	.10		
UG 15	16.80	188.386	2.64	21.31	.41	.10	.21	
CT 11	16.50	185.250	2.04	24.00	1.08	.15	.01	4.00

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	6	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	5	0	0	4	0	0	4	1	0
TOTAL COLIFORM MF	6	6	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	18	0	5	0	0	4	0	0	4	1	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	5	5	0	10	10	0	10	4	0
FLD CHLORINE FREE	.	.	.	5	5	0	10	8	0	10	4	0
FLD CHLORINE (TOTAL)	.	.	.	5	5	0	10	10	0	10	4	0
FLD PH	5	5	0	5	5	0	10	10	0	10	10	0
FLD TEMPERATURE	5	5	0	5	5	0	10	10	0	10	10	0
FLD TURBIDITY	5	5	0	5	5	0	10	10	0	10	10	0
*TOTAL SCAN CHEMISTRY (FLD)	15	15	0	30	30	0	60	58	0	60	42	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	12	12	0
CALCIUM	6	6	0	6	6	0	12	12	0	12	12	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	12	12	0
COLOUR	6	2	4	6	0	4	12	0	11	12	4	8
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	12	12	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	12	12	0
FLUORIDE	6	6	0	6	6	0	12	12	0	12	12	0
HARDNESS	6	6	0	6	6	0	12	12	0	12	12	0
IONCAL	6	6	0	6	6	0	12	12	0	12	12	0
LANGELIERS INDEX	6	6	0	3	3	0	8	8	0	11	11	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	12	12	0
SODIUM	6	6	0	6	6	0	12	12	0	12	12	0
AMMONIUM TOTAL	6	2	3	6	0	2	12	1	5	12	2	6
NITRITE	6	6	0	6	0	1	12	2	5	12	1	9
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	12	12	0
NITROGEN TOT KJELD	6	6	0	6	5	1	12	12	0	12	10	2
PH	6	6	0	6	6	0	12	12	0	12	12	0
PHOSPHORUS FIL REACT	6	3	2	6	1	3	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	4	2	6	0	3	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	12	12	0
TURBIDITY	6	6	0	6	6	0	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (LAB)	132	113	11	129	93	14	224	191	21	227	196	25

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	2	12	0	4	12	0	3
ALUMINUM	6	6	0	6	6	0	12	12	0	12	12	0
ARSENIC	6	0	6	6	0	6	12	0	12	12	0	10
BARIUM	6	6	0	6	6	0	12	12	0	12	12	0
BORON	6	3	3	6	4	2	12	7	5	12	5	7
BERYLLIUM	6	0	3	6	0	1	12	0	0	12	0	0
CADMIUM	6	0	2	6	0	0	12	0	5	12	1	1
COBALT	6	0	5	6	0	4	12	0	6	12	3	5
CHROMIUM	6	0	5	6	0	6	12	0	11	12	0	10
COPPER	6	4	2	6	0	6	12	4	8	12	12	0
IRON	6	5	1	6	0	4	12	4	7	12	7	5
MERCURY	6	1	0	6	0	2	.	.	.	.	.	.
MANGANESE	6	6	0	6	5	1	12	12	0	12	12	0
MOLYBDENUM	6	1	5	6	6	0	12	12	0	12	12	0
NICKEL	6	1	3	6	1	1	12	2	5	12	2	5
LEAD	6	6	0	6	0	4	12	12	0	12	7	5
ANTIMONY	6	2	4	6	0	6	12	2	10	12	8	4
SELENIUM	6	0	1	6	0	3	12	0	5	12	0	2
STRONTIUM	6	6	0	6	6	0	12	12	0	12	12	0
TITANIUM	6	2	4	6	2	4	12	3	9	12	4	8
THALLIUM	6	0	0	6	0	0	12	0	0	12	0	0
URANIUM	6	1	5	6	0	5	12	0	10	12	0	12
VANADIUM	6	3	3	6	5	1	12	8	4	12	7	5
ZINC	6	6	0	6	1	5	12	12	0	12	9	3
*TOTAL SCAN METALS	144	59	52	144	42	63	276	114	101	276	125	85
*TOTAL GROUP INORGANIC & PHYSICAL	291	187	63	303	165	77	560	363	122	563	363	110
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	6	0	0	6	0	0	6	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
HCB	6	0	0	6	0	0	6	0	0	6	0	0
HEXACHLOROETHANE	6	0	0	6	0	0	6	0	1	6	0	0
OCTACHLOROSTYRENE	6	0	0	6	0	0	6	0	0	6	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	0	84	0	1	84	0	0
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	6	0	0	6	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	6	0	0	5	0	0	1	0	0	1	0	0
ANTHRACENE	5	0	0	4	0	0	1	0	0	1	0	0
FLUORANTHENE	6	0	0	5	0	0	1	0	0	1	0	0
PYRENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	6	0	0	5	0	0	1	0	0	1	0	0
CHRYSENE	6	0	0	5	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	5	0	0	4	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	6	0	0	5	0	0	1	0	0	1	0	0
PERYLENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	5	0	0	4	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	6	0	0	5	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	5	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	6	0	0	5	0	0	1	0	0	1	0	0
CORONENE	6	0	0	5	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	99	0	0	82	0	0	17	0	0	17	0	0
PESTICIDES & PCB												
ALDRIN	6	0	0	6	0	0	6	0	0	6	0	0
ALPHA BHC	6	0	6	6	0	4	6	0	5	6	0	3
BETA BHC	6	0	0	6	0	0	6	0	0	6	0	0
LINDANE	6	0	0	6	0	0	6	0	1	6	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
GAMMA CHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
DIELDRIN	6	0	0	6	0	0	6	0	0	6	0	0
METHOXYCHLOR	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN 1	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN II	6	0	0	6	0	0	6	0	0	6	0	0
ENDRIN	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	6	0	0	6	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	6	0	0	6	0	0
HEPTACHLOR	6	0	0	6	0	0	6	0	0	6	0	0
MIREX	6	0	0	6	0	0	6	0	0	6	0	0
OXYCHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
OPDDT	6	0	0	6	0	0	6	0	0	6	0	0
PCB	6	0	0	6	0	0	6	0	0	6	0	0
DDD	6	0	0	6	0	0	6	0	0	6	0	0
PPDDE	6	0	0	6	0	0	6	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	6	0	0	6	0	0	6	0	0	6	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	2	6	0	2	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	2	0	0	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	206	0	8	206	0	6	128	0	6	128	0	3
PHENOLICS												
PHENOLICS	6	0	2	5	1	1	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	0	2	5	1	1	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	6	0	0	6	0	0	6	0	0
2,4,5-T	1	0	0	1	0	0	.	.	.	.	.	.
2,4-D	1	0	0	1	0	0	.	.	.	.	.	.
2,4-DB	1	0	0	1	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	1	0	0	1	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	1	0	0	1	0	0	.	.	.	.	.	.
DIAZINON	1	0	0	1	0	0	.	.	.	.	.	.
DICHLOROVOS	1	0	0	1	0	0	.	.	.	.	.	.
CHLORPYRIFOS	1	0	0	1	0	0	.	.	.	.	.	.
ETHION	1	0	0	1	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	1	0	0	1	0	0	.	.	.	.	.	.
MEVINPHOS	1	0	0	1	0	0	.	.	.	.	.	.
METHYL PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
METHYLTRITHION	1	0	0	1	0	0	.	.	.	.	.	.
PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
PHORATE	0	0	0	0	0	0	.	.	.	.	.	.
RELDAN	1	0	0	1	0	0	.	.	.	.	.	.
RONNEL	1	0	0	1	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	1	0	0	1	0	0	.	.	.	.	.	.
CICP	1	0	0	1	0	0	.	.	.	.	.	.
DIALLATE	1	0	0	1	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	1	0	0	.	.	.	.	.	.
IPC	1	0	0	1	0	0	.	.	.	.	.	.
PROPOXUR	1	0	0	1	0	0	.	.	.	.	.	.
CARBARYL	1	0	0	1	0	0	.	.	.	.	.	.
BUTYLATE	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	31	0	0	31	0	0	6	0	0	6	0	0
VOLATILES												
BENZENE	6	0	1	6	0	1	6	0	1	5	0	1
TOLUENE	6	0	1	6	0	2	6	0	4	5	0	2
ETHYLBENZENE	6	0	0	6	0	4	6	0	4	5	0	2
P-XYLENE	6	0	0	6	0	0	6	0	0	5	0	0
M-XYLENE	6	0	0	6	0	0	6	0	0	5	0	0
O-XYLENE	6	0	0	6	0	0	6	0	0	5	0	0
STYRENE	6	0	0	6	0	0	6	0	0	5	0	1
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	5	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	6	0	0	5	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	5	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
CHLOROFORM	6	0	0	6	6	0	6	6	0	5	5	0
111, TRICHLOROETHANE	6	0	1	6	0	1	6	0	1	5	0	1
1,2 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0	6	0	0	5	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0	6	0	0	5	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	5	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0	6	6	0	5	5	0
112 TRICHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
CHLORODIBROMOMETHANE	6	0	0	6	6	0	6	6	0	5	5	0
T-CHLOROETHYLENE	6	0	0	6	0	0	6	0	0	5	0	0
BROMOFORM	6	0	0	6	0	3	6	0	3	5	0	2
1122 T-CHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	6	0	3	5	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0	6	0	0	5	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	6	6	0	5	5	0
*TOTAL SCAN VOLATILES	174	0	3	174	24	11	174	24	16	145	20	9
*TOTAL GROUP ORGANIC	606	0	13	588	25	18	409	24	23	380	20	12

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
- 1. Maximum Acceptable Concentration (MAC)
- 1+. MAC for Total Trihalomethanes
- 2. Interim Maximum Acceptable Concentration (IMAC)
- 3. Aesthetic Objective (AO)
- 3*. AO for Total Xylenes
- 4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
- 1. Maximum Acceptable Concentration (MAC)
- 2. Proposed MAC
- 3. Interim MAC
- 4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
- 1. Guideline Value (GV)
- 2. Tentative GV
- 3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
- 1. Maximum Contaminant Level (MCL)
- 2. Suggested No-Adverse Effect Level (SNAEL)
- 3. Lifetime Health Advisory
- 4. EPA Ambient Water Quality Criteria
- 4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
- 1. Health Related Guideline Level
- 2. Aesthetic Guideline Level
- 3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T# (T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)		
FEB	16	.	.	.	.	.
APR	64	.	.	.	.	.
JUN	2	.	.	.	.	.
AUG	300 >	.	.	.	.	.
OCT	152	.	.	.	.	.
DEC	16	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)		
FEB	.	0 <=>	.	0 <=>	.	1 <=>
APR	.	3 <=>	.	.	.	.
JUN	.	.	.	3 <=>	.	11
AUG	.	0 <=>	.	.	.	.
OCT	.	2 <=>	.	1 <=>	.	3 <=>
DEC	.	1 <=>	.	2 <=>	.	4 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)		
FEB	140	.	.	.	.	.
APR	120	.	.	.	.	.
JUN	68	.	.	.	.	.
AUG	3000 >	.	.	.	.	.
OCT	2800	.	.	.	.	.
DEC	1800	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A		
FEB	2900	.	.	.	.	.
APR	600	.	.	.	.	.
JUN	2120	.	.	.	.	.
AUG	48000 >	.	.	.	.	.
OCT	40000	.	.	.	.	.
DEC	27000	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.230	.200	.200	.000	.150
APR	.	.350	.350	.250	.000	.000
JUN	.	.220	.150	.200	.100	.100
AUG	.	.150	.050	.100	.000	.000
OCT	.	.250	.100	.150	.000	.150
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.990	.050	.700	.000	.250
APR	.	.830	.100	.450	.000	.000
JUN	.	.940	.300	.500	.050	.350
AUG	.	.650	.000	.250	.000	.000
OCT	.	.960	.000	.300	.000	.100
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	1.220	.250	.900	.000	.400
APR	.	1.180	.450	.700	.000	.000
JUN	.	1.160	.450	.700	.150	.450
AUG	.	.800	.050	.350	.000	.000
OCT	.	1.210	.100	.450	.000	.250
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	8.200	7.650	7.300	7.300	7.500	7.300
APR	8.100	7.250	7.300	7.100	7.300	7.300
JUN	8.150	7.500	7.200	7.200	7.300	7.200
AUG	8.150	7.600	7.300	7.300	7.500	7.500
OCT	8.000	7.300	7.100	7.100	7.400	7.300
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
FEB	3.000	3.000	18.500	5.000	16.700	5.300
APR	6.000	6.500	21.000	7.500	16.700	8.900
JUN	19.500	18.500	23.500	17.500	21.100	15.600
AUG	24.000	22.500	23.500	21.700	20.000	18.900
OCT	17.000	16.000	20.500	17.500	14.400	17.200
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
FEB	1.800	.220	.270	.200	.380	.220
APR	12.800	.800	.190	.210	.460	.410
JUN	4.500	.300	.640	.220	.400	1.140
AUG	15.800	.420	.350	.240	.410	.630
OCT	46.000	.250	.390	.290	.470	.330

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
FEB	88.700	77.900	81.500	78.300	79.800	79.800
APR	95.200	82.600	81.900	82.100	80.200	80.000
JUN	86.800	76.800	77.200	77.200	78.800	79.100
AUG	83.300	74.500	74.100	73.800	76.500	76.800
OCT	85.000	73.800	77.100	75.200	79.800	78.700
DEC	112.700	98.300	99.400	95.100	95.700	93.800
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
FEB	31.300	31.400	32.700	32.000	32.800	32.900
APR	37.400	37.200	36.400	36.400	35.800	35.200
JUN	29.400	30.000	30.400	30.400	31.400	31.200
AUG	30.100	29.300	29.700	30.000	31.400	31.500
OCT	30.200	31.500	31.700	31.200	32.300	32.600
DEC	41.600	42.200	42.800	40.000	39.800	37.600
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
FEB	10.900	12.700	13.400	13.100	13.800	13.700
APR	12.000	13.400	13.700	13.700	12.800	12.500
JUN	8.000	10.200	10.300	10.400	10.400	10.300
AUG	9.600	9.500	11.400	11.400	11.400	11.600
OCT	7.100	9.300	9.300	9.500	9.800	9.700
DEC	13.200	14.500	15.200	14.100	13.600	12.600
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
FEB	2.000 <T	BDL	2.000 <T	.500 <T	2.000 <T	1.500 <T
APR	4.000	1.000 <T	1.000 <T	1.000 <T	2.000 <T	1.500 <T
JUN	1.000 <T	BDL	.500 <T	BDL	.500 <T	.500 <T
AUG	1.000 <T	.500 <T	1.500 <T	.500 <T	1.000 <T	3.000
OCT	.500 <T	.500 <T	2.000 <T	.500 <T	3.000	1.500 <T
DEC	2.500	1.000 <T	2.000 <T	.500 <T	3.000	4.500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
FEB	242	248	257	252	257	256
APR	277	282	282	282	271	271
JUN	228	240	242	241	243	243
AUG	229	231	232	232	237	237
OCT	227	243	245	245	247	246
DEC	312	328	326	309	311	296
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
FEB	1.700	1.500	1.500	1.500	1.600	1.500
APR	2.000	1.500	1.500	1.600	1.600	1.400
JUN	1.600	1.300	1.400	1.400	1.600	1.500
AUG	1.600	1.200	1.400	1.500	1.500	1.500
OCT	1.700	1.400	1.400	1.500	1.500	1.500
DEC	2.300	1.700	1.700	1.600	1.600	1.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
FEB	.100	1.240	1.220	1.180	1.180	1.120
APR	.100	1.160	1.120	1.140	1.060	1.040
JUN	.080	1.100	1.120	1.100	1.080	1.100
AUG	.080	.480	1.020	.640	1.140	1.160
OCT	.080	1.120	1.060	1.120	1.100	1.100
DEC	.100	1.040	1.080	1.000	1.020	1.020
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
FEB	109.700	110.100	112.900	111.800	114.300	114.500
APR	129.000	129.000	127.000	126.000	124.000	122.000
JUN	106.000	108.000	109.000	109.000	111.000	111.000
AUG	107.000	105.000	105.300	105.200	110.700	108.900
OCT	105.400	109.300	110.200	109.000	112.800	112.800
DEC	141.000	143.000	143.000	135.000	136.000	128.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	2.263	1.774	.276	1.989	2.500	2.419
APR	3.057	5.330	4.006	3.701	5.023	3.748
JUN	.245	.935	1.543	1.681	2.090	1.838
AUG	3.684	4.754	3.303	2.217	6.432	4.530
OCT	1.748	3.509	2.784	2.729	4.086	4.699
DEC	2.716	1.580	1.014	2.142	1.819	2.826
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	.267	.010	.193	.159	.216	.207
APR	.271	-.214	-.118	-.156	.010	-.098
JUN	.286	-.053	.004	.004	.177	.106
AUG	.178	-.063	-.100	-.077	.026	.069
OCT	.239	.130	.191	.163	.273	.251
DEC	.559	.144	.135	.258	.218	.200
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)		
FEB	7.650	7.700	7.600	7.750	7.900	7.850
APR	8.700	8.800	8.800	8.600	8.400	8.300
JUN	7.900	8.000	8.000	8.100	7.900	8.000
AUG	7.750	7.750	7.550	7.350	7.850	7.350
OCT	7.300	7.450	7.550	7.550	7.800	7.600
DEC	9.100	9.100	8.900	8.700	8.900	8.300
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
FEB	6.600	7.000	6.800	6.900	7.200	7.200
APR	6.400	6.400	6.400	6.600	6.200	6.000
JUN	5.000	5.000	5.000	5.000	5.000	5.000
AUG	5.700	5.100	5.200	4.900	5.400	5.300
OCT	4.100	4.300	4.300	4.500	4.600	4.600
DEC	6.800	6.800	6.800	6.600	6.600	6.200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
FEB	.004 <T	BDL	BDL	BDL	BDL	BDL
APR	.008 <T	BDL	BDL	BDL	.002 <T	.002 <T
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	.032	BDL	.012	.008 <T	.008 <T	.014
OCT	.010	.002 <T	.006 <T	.008 <T	.004 <T	.004 <T
DEC	.006 <T	.006 <T	.004 <T	.004 <T	.006 <T	.016
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
FEB	.007	BDL	.001 <T	BDL	.001 <T	.001 <T
APR	.016	BDL	BDL	BDL	.001 <T	BDL
JUN	.006	BDL	.006	.006	.003 <T	.003 <T
AUG	.005	.002 <T	.004 <T	.003 <T	.005	.004 <T
OCT	.005	BDL	.001 <T	.001 <T	.001 <T	BDL
DEC	.019	BDL	BDL	BDL	.002 <T	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
FEB	.810	.870	.935	.950	.985	.995
APR	1.400	1.340	1.280	1.290	1.120	1.080
JUN	.350	.465	.495	.515	.460	.460
AUG	.275	.250	.260	.260	.290	.265
OCT	.290	.320	.310	.360	.330	.340
DEC	1.580	1.660	1.540	1.430	1.420	1.200
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.180	.100	.140	.120	.180	.140
APR	.190	.120	.120	.110	.080 <T	.080 <T
JUN	.170	.090 <T	.110	.110	.120	.100
AUG	.210	.110	.140	.110	.130	.110
OCT	.340	.110	.130	.130	.140	.140
DEC	.340	.140	.180	.160	.200	.150
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	8.240	8.040	8.190	8.180	8.220	8.210
APR	8.150	7.730	7.840	7.800	7.980	7.880
JUN	8.290	8.000	8.050	8.050	8.200	8.130
AUG	8.190	8.010	7.970	7.990	8.060	8.100
OCT	8.240	8.180	8.220	8.210	8.280	8.260
DEC	8.330	7.970	7.950	8.120	8.080	8.090
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
FEB	.000 <T	.000 <T	.	.	.	.
APR	.008	.003	.	.	.	.
JUN	.001 <T	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	.012	.001 <T	.	.	.	.
DEC	.016	.001 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
FEB	.005 <T	.003 <T	.	.	.	.
APR	.018	.003 <T	.	.	.	.
JUN	.007 <T	BDL	.	.	.	.
AUG	.013	BDL	.	.	.	.
OCT	.056	BDL	.	.	.	.
DEC	.038	.003 <T	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
FEB	18.990	23.210	23.300	23.140	23.090	23.330
APR	20.850	28.310	28.590	28.390	27.450	27.570
JUN	16.420	23.740	23.380	23.410	23.160	23.220
AUG	16.740	21.170	20.850	21.590	20.570	20.260
OCT	15.670	25.470	23.970	24.660	22.150	22.580
DEC	22.400	34.000	32.200	31.800	31.800	28.500
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
FEB	2.200	.390	.590	.450	.810	.470
APR	11.300	1.500	.420	.480	1.000	.480
JUN	3.500	.600	.750	.500	.750	1.300
AUG	7.000	.410	.800	.660	.760	.870
OCT	40.000	.380	.640	.560	.750	.520
DEC	34.000	.900	.620	.390	1.130	1.220

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
FEB	BDL	.110 <T	.080 <T	.120 <T	.090 <T	BDL
APR	BDL	.150 <T	.090 <T	.120 <T	.130 <T	.080 <T
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
FEB	29.000	140.000	66.000	95.000	94.000	100.000
APR	130.000	140.000	53.000	56.000	66.000	66.000
JUN	60.000	140.000	74.000	71.000	95.000	200.000
AUG	87.000	140.000	120.000	130.000	130.000	140.000
OCT	280.000	77.000	75.000	70.000	81.000	85.000
DEC	260.000	130.000	57.000	46.000	58.000	44.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
FEB	.470 <T	.640 <T	.500 <T	.370 <T	.290 <T	.360 <T
APR	.560 <T	.350 <T	.340 <T	.370 <T	.370 <T	.350 <T
JUN	.790 <T	.430 <T	.420 <T	.340 <T	.370 <T	.380 <T
AUG	.810 <T	.300 <T	.290 <T	.280 <T	.370 <T	.530 <T
OCT	.940 <T	.380 <T	.410 <T	.380 <T	.470 <T	.380 <T
DEC	.540 <T	.280 <T	.280 <T	.200 <T	BDL	BDL
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
FEB	16.000	16.000	19.000	16.000	18.000	16.000
APR	16.000	15.000	14.000	15.000	16.000	14.000
JUN	14.000	14.000	14.000	14.000	15.000	15.000
AUG	16.000	17.000	17.000	17.000	17.000	16.000
OCT	18.000	16.000	18.000	16.000	15.000	16.000
DEC	20.000	17.000	20.000	16.000	17.000	16.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
FEB	16.000 <T	15.000 <T	17.000 <T	15.000 <T	17.000 <T	16.000 <T
APR	32.000	32.000	27.000	33.000	19.000 <T	27.000
JUN	22.000	22.000	21.000	21.000	20.000 <T	19.000 <T
AUG	25.000	26.000	25.000	25.000	25.000	25.000
OCT	18.000 <T	19.000 <T	20.000 <T	19.000 <T	19.000 <T	19.000 <T
DEC	17.000 <T	32.000	33.000	17.000 <T	27.000	27.000
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	.060 <T	.090 <T	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
OCT	.060 <T	BDL	BDL	BDL	BDL	BDL
DEC	.060 <T	BDL	BDL	BDL	BDL	BDL

TABLE 5
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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.230 <T	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	.080 <T	BDL	BDL	BDL
AUG	.070 <T	BDL	.130 <T	BDL	BDL	BDL
OCT	BDL	BDL	.220 <T	BDL	.700	BDL
DEC	.060 <T	BDL	.310 <T	BDL	.200 <T	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.170 <T	.130 <T	.180 <T	.100 <T	5.600	.250 <T
APR	.120 <T	.070 <T	BDL	BDL	4.400	.040 <T
JUN	.040 <T	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
OCT	.460 <T	.080 <T	.080 <T	.080 <T	6.000	.080 <T
DEC	.370 <T	.110 <T	.100 <T	.110 <T	.190 <T	.080 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
FEB	BDL	.930 <T	BDL	.560 <T	BDL	BDL
APR	3.100 <T	3.100 <T	2.100 <T	3.000 <T	1.100 <T	2.400 <T
JUN	2.000 <T	2.000 <T	1.900 <T	1.800 <T	1.500 <T	1.700 <T
AUG	2.000 <T	1.800 <T	1.400 <T	1.800 <T	1.400 <T	1.300 <T
OCT	2.500 <T	1.900 <T	2.000 <T	1.900 <T	1.400 <T	1.500 <T
DEC	.900 <T	4.500 <T	3.800 <T	1.000 <T	2.800 <T	2.400 <T
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
FEB	16.000	.870 <T	9.800	1.600 <T	52.000	6.900
APR	19.000	.980 <T	3.000 <T	1.300 <T	52.000	7.100
JUN	24.000	1.000 <T	7.800	1.500 <T	52.000	12.000
AUG	5.000 <T	.540 <T	6.600	.930 <T	29.000	6.900
OCT	20.000	.790 <T	4.800 <T	1.600 <T	29.000	7.100
DEC	2.600 <T	2.800 <T	6.000	2.400 <T	60.000	11.000
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
FEB	47.000 <T	17.000 <T	63.000	13.000 <T	82.000	58.000 <T
APR	180.000	17.000 <T	9.500 <T	8.700 <T	52.000 <T	31.000 <T
JUN	82.000	BDL	21.000 <T	BDL	59.000 <T	67.000
AUG	170.000	BDL	85.000	12.000 <T	79.000	160.000
OCT	560.000	6.900 <T	84.000	9.700 <T	130.000	54.000 <T
DEC	440.000	18.000 <T	83.000	9.900 <T	120.000	170.000
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
FEB	BDL	.030 <T	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	.130	.080 <T	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
FEB	2.900	.700	2.400	2.200	6.000	5.100
APR	4.600	.810	2.000	2.600	4.300	3.500
JUN	4.200	.780	1.200	1.400	3.800	2.500
AUG	8.800	.420 <T	2.800	1.700	9.500	13.000
OCT	32.000	.530	2.100	1.300	10.000	4.100
DEC	17.000	.690	2.200	1.800	7.800	16.000
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.630	.610	.560	.630	.620	.630
APR	.480 <T	.650	.570	.570	.640	.600
JUN	.490 <T	.650	.570	.680	.610	.660
AUG	.460 <T	.660	.710	.520	.540	.640
OCT	.180 <T	.580	.550	.570	.550	.540
DEC	.380 <T	.830	.790	.840	.840	.630
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
FEB	6.100	5.500	8.200	5.100	5.800	5.500
APR	BDL	BDL	BDL	.240 <T	BDL	.410 <T
JUN	.270 <T	BDL	BDL	BDL	.540 <T	BDL
AUG	BDL	BDL	.830 <T	BDL	BDL	BDL
OCT	1.600 <T	.600 <T	.490 <T	.570 <T	.550 <T	.310 <T
DEC	.890 <T	BDL	.420 <T	BDL	.470 <T	BDL
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
FEB	11.000	.120 <T	4.300	1.400	5.200	.350 <T
APR	8.100	BDL	1.400	1.200	4.300	.230 <T
JUN	2.100	.070 <T	3.300	1.600	3.000	.500 <T
AUG	1.300	.070 <T	5.900	2.000	2.700	.750
OCT	4.000	BDL	6.300	2.500	1.700	.390 <T
DEC	1.400	.110 <T	6.300	1.600	5.300	.400 <T
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
FEB	.600	.490 <T	.610	.440 <T	20.000	.740
APR	.260 <T	.360 <T	.370 <T	.320 <T	15.000	.330 <T
JUN	.440 <T	.380 <T	.450 <T	.370 <T	.540	.430 <T
AUG	.530	.390 <T	.560	.420 <T	.570	.550
OCT	.260 <T	.380 <T	.470 <T	.350 <T	16.000	.440 <T
DEC	.330 <T	.400 <T	.450 <T	.390 <T	.660	.460 <T
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
FEB	BDL	1.300 <T	1.200 <T	BDL	BDL	BDL
APR	BDL	1.300 <T	2.200 <T	BDL	BDL	BDL
JUN	BDL	BDL	1.200 <T	BDL	BDL	1.600 <T
AUG	1.500 <T	1.900 <T	1.200 <T	1.400 <T	BDL	2.000 <T
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
FEB	130.000	130.000	140.000	130.000	140.000	130.000
APR	130.000	130.000	120.000	130.000	120.000	120.000
JUN	110.000	110.000	110.000	110.000	110.000	110.000
AUG	110.000	110.000	110.000	110.000	110.000	110.000
OCT	110.000	110.000	120.000	120.000	110.000	110.000
DEC	150.000	150.000	160.000	140.000	130.000	130.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
FEB	6.900	7.700	8.300	8.100	10.000	11.000
APR	5.000 <T	4.400 <T	3.700 <T	3.700 <T	3.900 <T	3.600 <T
JUN	5.900	5.100	5.300	4.900 <T	7.400	7.700
AUG	4.600 <T	4.000 <T	3.600 <T	3.000 <T	4.200 <T	3.700 <T
OCT	3.900 <T	2.600 <T	2.800 <T	2.800 <T	2.600 <T	2.600 <T
DEC	4.500 <T	3.700 <T	3.300 <T	3.100 <T	3.600 <T	2.700 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
FEB	.240 <T	.240 <T	.210 <T	.200 <T	.240 <T	.260 <T
APR	.410 <T	.320 <T	.270 <T	.260 <T	.250 <T	.250 <T
JUN	.220 <T	.150 <T	.160 <T	.160 <T	.190 <T	.160 <T
AUG	.080 <T	BDL	BDL	BDL	.250 <T	.220 <T
OCT	.270 <T	.140 <T	.150 <T	.150 <T	.160 <T	.180 <T
DEC	.640	.410 <T	.290 <T	.350 <T	.230 <T	.210 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.530	.990	1.000	.940	1.000	.840
APR	.500 <T	.820	.580	.660	.540	.550
JUN	.350 <T	.450 <T	.460 <T	.410 <T	.470 <T	.600
AUG	.470 <T	.550	.650	.450 <T	.570	.620
OCT	.930	.700	.730	.540	.500 <T	.480 <T
DEC	.770	.590	.580	.410 <T	.310 <T	.210 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
FEB	11.000	1.800 <T	200.000	16.000	30.000	2.700
APR	6.000	.910 <T	66.000	13.000	35.000	1.700 <T
JUN	3.800	1.400 <T	86.000	12.000	18.000	2.500
AUG	3.300	.980 <T	140.000	12.000	13.000	1.800 <T
OCT	7.800	1.300 <T	140.000	21.000	12.000	1.400 <T
DEC	5.500	3.200	200.000	21.000	23.000	2.500

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	1.000 <T	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
FEB	2.000 <T	2.000 <T	.	1.000 <T	.	BDL
APR	2.000 <T	2.000 <T	.	2.000 <T	.	2.000 <T
JUN	4.000 <T	BDL	.	1.000 <T	.	1.000 <T
AUG	1.000 <T	BDL	.	BDL	.	BDL
OCT	1.000 <T	2.000 <T	.	2.000 <T	.	3.000 <T
DEC	1.000 <T	1.000 <T	.	1.000 <T	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	1.000 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	60.000 <T	100.000 <T	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	170.000 <T	110.000 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .200	GUIDELINE = 2 (A4)		
FEB	.600 <T	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	.	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	.800 <T	.	.	.	.
DEC	.800 <T	1.000	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	.050 <T	BDL	.	BDL	.	.
APR	BDL	.050 <T	.	BDL	.	.050 <T
JUN	BDL	BDL	.	.050 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
FEB	.050 <T	.050 <T	.	.050 <T	.	.
APR	BDL	BDL	.	BDL	.	.100 <T
JUN	BDL	.050 <T	.	.150 <T	.	.050 <T
AUG	BDL	BDL	.	.050 <T	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	.050 <T	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
FEB	BDL	BDL	.	BDL	.	.
APR	BDL	.100 <T	.	.150 <T	.	.150 <T
JUN	BDL	.100 <T	.	.150 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	.050 <T	.	.100 <T	.	.050 <T
DEC	BDL	.050 <T	.	.050 <T	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
FEB	BDL	BDL	.	BDL	.	.
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	.050 <T
DEC	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	BDL	16.700	.	19.000	.	.
APR	BDL	30.500	.	31.400	.	28.300
JUN	BDL	24.400	.	28.200	.	25.000
AUG	BDL	19.200	.	22.900	.	22.100
OCT	BDL	25.000	.	26.600	.	22.000
DEC	BDL	29.100	.	22.900	.	22.700
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
FEB	BDL	BDL	.	BDL	.	.
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	.060 <T	.040 <T	.	.040 <T	.	.020 <T
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WINDSOR WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)		
FEB	BDL	11.850	.	12.300	.	.
APR	BDL	13.000	.	13.050	.	11.900
JUN	BDL	10.900	.	11.800	.	10.900
AUG	BDL	11.250	.	11.750	.	10.950
OCT	BDL	9.300	.	9.700	.	9.550
DEC	BDL	10.750	.	9.450	.	9.750
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
FEB	BDL	5.000	.	4.900	.	.
APR	BDL	3.400	.	3.500	.	3.900
JUN	BDL	3.500	.	3.600	.	3.500
AUG	BDL	4.100	.	4.400	.	4.100
OCT	BDL	2.200	.	2.200	.	2.700
DEC	BDL	2.000	.	1.900	.	2.100
BROMOFORM (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)		
FEB	BDL	.400 <T	.	.400 <T	.	.
APR	BDL	BDL	.	BDL	.	.200 <T
JUN	BDL	.200 <T	.	.200 <T	.	BDL
AUG	BDL	.200 <T	.	.400 <T	.	.200 <T
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
1,4 DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.	.200 <T	.	.
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	.100 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	.300 <T	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
FEB	BDL	33.950	.	36.650	.	.
APR	BDL	46.900	.	47.950	.	44.300
JUN	BDL	39.000	.	43.800	.	39.400
AUG	BDL	34.750	.	39.400	.	37.400
OCT	BDL	36.400	.	38.450	.	34.200
DEC	BDL	41.900	.	34.300	.	34.450

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POC0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHO D ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.